agri-fax Alberta AGRICULTURE

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Dugouts for Farm Water Supplies

Dugouts are a popular source of water in areas where groundwater is not available, or is of poor quality or low quantity. In many cases, dugout water is used only for watering livestock or irrigation. However, it may be used for human consumption if it is adequately treated.

The farm dugout should be properly planned and located to ensure that it will readily fill with water. Care should also be taken to ensure that sources of contamination are avoided.

Capacity

The first step in planning a dugout is to determine the capacity required. Add up your daily water requirements, based upon Table 1, and multiply by 365 to obtain your yearly water requirement. The dugout capacity should equal two to three year's requirement. In areas where the dugout can be filled from an irrigation canal, the dugout can be sized for a 200-day capacity.

Allowance must also be made for evaporation in summer and ice buildup in winter.

TABLE 1. — Your Daily Water Requirements

Human	50 gallons/day
Dairy Cow	35 gallons/day
Beef Cow, Bull, Steer	15 gallons/day
Horse	12 gallons/day
Hog	5 gallons/day
Sheep	3 gallons/day
100 Chickens	8 gallons/day
100 Turkeys	12 gallons/day

Size

The dugout should be at least 14 feet deep to ensure good water quality. The length and width of the dugout can be selected as they best suit the individual situation. Table 2 illustrates the approximate sizes for a 14-feet deep dugout of various capacities.

The sizes in Table 2 are based upon the construction of 1½ to 1 side slopes and 4 to 1 end slopes. However, slightly steeper end slopes will reduce weed growth in the dugout.

TABLE 2 — Approximate Dugout Capacities (Imperial Gallons)

Width (feet)	60	70	80	90	100	110	120
Length (feet)							
140	320,000	393,500	467,000	540,500	613,500	687,000	760,500
160	388,500	479,500	570,000	661,000	751,500	842,500	933,500
180	456,500	565,000	673,000	781,500	890,000	998,000	1,106,500
200	524,500	650,500	776,500	902,000	1,028,000	1,153,500	1,279,500
220	593,000	736,000	879,000	1,022,500	1,166,000	1,309,000	1,452,500
240	661,000	821,500	982,500	1,143,000	1,304,000	1,464,000	1,625,500
260	729,000	907,000	1,085,685	1,263,500	1,442,000	1,619,000	1,798,500
280	797,000	993,000	1,188,500	1,383,500	1,580,000	1,774,000	1,971,500
300	865,500	1,078,500	1,291,500	1,503,500	1,718,000	1,929,000	2,144,500

Based Upon: 14 ft depth, 4:1 end slopes, 1½ side slopes

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Location

In choosing a dugout location, the following points should be considered.

Available drainage into the dugout

The drainage area required to fill the dugout will vary in size from one acre per 100 square feet of dugout surface area in southern Alberta to one-half acre in the Peace River area. For example, a 200 ft x 100 ft x 14 ft dugout will have a surface area of 20,000 square feet and will need a drainage area of 200 acres in southern Alberta and 100 acres in Northern areas.

Nature of drainage area

Hayland and woodland usually provide the best drainage areas. Water draining in from other areas may be high in impurities, such as mud, silt, fertilizer, herbicide and manure.

Soil texture

A dugout can be constructed in almost any texture of soil. Dugouts located in clays will be watertight. However, dugouts located in coarser silts and sands will be porous and will require sealing to prevent excessive seepage. Test holes should be dug at the four corners and centre of the site, to approximately five feet below the proposed dugout bottom, to determine the texture of the soil.

Distances

A dugout should be as close to the intended point of use as possible. This will minimize the cost of piping, power and pumping equipment. However, a dugout must be located certain distances away from sources of contamination. Table 3 shows the minimum distances required between a dugout and sources of contamination. These distances are the minimum allowed; the further away the dugout is located the better. Common sense should be used in locating the dugout away from sources of contamination.

TABLE 3 — Minimum Distances for Dugout Location

Source of Contamination	Distance from Dugout
Septic tank	25 feet
Sewage disposal field	50 feet
Corral	50 feet
Cesspool, sewage mound	100 feet
Jet-type sewage ejector	150 feet
Sewage lagoon	300 feet

Topography

In order to reduce evaporation and other losses, a dugout should be located in a natural depression. Also, natural depressions tend to accumulate more snow in winter. This is a very important source of water for a dugout.

A dugout can also be located close to a water course. The dugout can be filled from the water course in the spring. When the dugout is full, excess water and silt can bypass the dugout.

Finishing

Earth from the dugout excavation should be moved and leveled away from the sides of the dugout. This will prevent erosion of the spoil piles back into the dugout.

When the dugout is completed, the banks and a 100 foot strip around should be seeded to grass. A good mixture is 80 per cent timothy and 20 per cent alsike clover. This will prevent erosion of the banks and subsequent siltation of the dugout. The dugout should also be fenced to prevent entry by livestock or children. A 20 per cent porous fence on the windward side, or a solid fend on the leeward side will ensure good snow accumulation on the dugout over the winter. Trees should be kept at least 100 feet from the banks of the dugout.

Further information is available through your agricultural engineering technologist who can be contacted through the local district agriculturist or district home economist.

Other Agrifax:
Dugout Aeration with Compressed Air — FS716 (B13)
Dugout Maintenance — FS716 (B31)
Seepage Control in Dugouts — FS716 (B32)

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